

REMARKS

In the present Office Action, the drawings were objected to and claims 1-32 were initially rejected. Applicants respectfully request reconsideration and allowance of the application in view of the following remarks.

I. DRAWING OBJECTIONS

The drawings were objected to based on two informalities. First, the Office Action stated that figure 1 has an extra bracket on the left hand side without a reference numeral. This bracket was placed in figure 1 in order to comply with 37 CFR §1.84(h)(1), which indicates that when an exploded view is shown in a figure which is on the same sheet as another figure, the exploded view should be placed in brackets. The bracket along the left hand side of figure 1 was intended to indicate that the exploded elements are all part of the same figure and not to indicate any particular element. Therefore, this bracket is believed not to require a reference numeral. Second, the Office Action indicated that the information regarding Applicants' phone number, attorney docket number, etc. should be deleted from the front sheet of the drawings. However, this information was added to comply with 37 CFR §1.84(c), which requests that identifying indicia be provided and requires such indicia to be placed on the front of each sheet and centered with the top margin.

For these reasons, Applicants respectfully request that the objection to the drawings be withdrawn.

II. CLAIM REJECTIONS

Claims 1-32 were rejected under 35 U.S.C. §102(e) as being anticipated by Hosomi, U.S. Publication No. 2003/0209807, now U.S. Patent No. 6,768,206.

The present disclosure relates to a routing methodology for reducing a difference between the lengths of two traces in a differential signal pair for an existing bump pattern.

Independent claim 1 is directed to a flip chip substrate having first and second traces routed between a pair of first and second contacts on a top layer and a pair of third and fourth contacts, respectively, on a bottom layer. The first and second contacts (and the third and fourth contacts) correspond to a differential signal pair. In claim 1, the second trace is routed out of the die bounding area on a different one of the layers than the first trace. The second trace comprises a via in the die bonding area extending from the top layer to another of the plurality of layers. This via is laterally offset from the second contact in a direction toward the first contact.

The Hosomi patent does not mention differential signal pairs. Although a typical flip chip could include one or more differential signal pairs, Hosomi does not teach how such pairs should be routed relative to one another through a flip chip substrate.

Hosomi does not disclose a second trace of a differential signal pair being routed out of a die bonding area on a different one of the layers than the first trace of the differential signal pair. Further, Hosomi does not disclose that the second trace has a via in the die bonding area, which is laterally offset from the second contact in a direction toward the first contact.

The Office Action directs Applicants' attention to Hosomi figures 8-10 and paragraphs 0015, 0031 and 0032. With respect to FIG. 8, this figure simply shows a signal trace 110 routed between two adjacent vias 70. This figure does not illustrate a second trace (of a differential signal pair routed out of a die bonding area on a different one of the layers than the first trace of the differential signal pair), as required by claim 1.

With respect to figures 9 and 10, these figures show vertical columns 114 of pads 116 located at lattice points 118.

The pads 116 are electrically connected to vias 120 also located at the lattice points 118. The pads 116 that overlies the vias 120 are referred to as "pad-on-vias" and are indicated by three concentric circles 122. Pads 140 without underlying vias 120 are located at interstitial points 142.

The signal pads are indicated by reference numerals 46 whereas core power pads are indicated by reference numeral 54, I/O power pads are indicated by reference numeral 56 and ground pads are indicated by reference numeral 58. The pads 140 without underlying vias 120 correspond to power and ground pads.

The pad-on-via routing scheme does not provide leeway for positioning the vias at a laterally offset location relative to the corresponding contact. In fact, Hosomi does not disclose such an offset. Thus, the statement in the Office Action that suggests Hosomi discloses a via of a second trace, which is laterally offset from the second contact in a direction toward the first contact is incorrect. Hosomi discloses no such offset and particularly no offset with respect to differential signal pairs and their corresponding contacts.

Since Hosomi does not disclose numerous elements within independent claim 1, Applicants respectfully request that the rejection of claim 1 and its dependent claims 2-12 under §102(e) be withdrawn. In addition, dependent claims 2-12 add further elements that are not taught by Hosomi, particularly in the context of differential signal pairs.

With respect to independent claim 13, this claim requires the first trace to have a first segment extending outwardly from the first contact toward an edge of the die bonding area along the top layer. The second trace extends from the second contact to a second one of the layers within the die bonding area. The second trace extends outwardly from the die bonding area along the second layer, and returns to the top layer

externally to the die bonding area. Hosomi does not disclose such a routing pattern for a differential signal pair.

Claim 13 further requires the first and second traces to extend along the top layer outside the die bonding area to respective vias and extend downwardly from the respective vias toward the third and fourth contacts, respectively. Again, Hosomi does not disclose such a routing pattern.

Applicants therefore respectfully request that the rejection of claim 13 and its dependent claims 14-21 under §102(e) be withdrawn. Dependent claims 14-21 include numerous other elements that are neither taught nor suggested by Hosomi.

With respect to independent claim 22, this claim requires the first and second traces to comprise a pair of respective vias extending from the bottom layer to another of the plurality of layers, wherein the pair of respective vias are laterally offset toward one another relative to centers of the third and fourth contacts (of a differential signal pair), respectively. Again, Hosomi does not disclose such an offset.

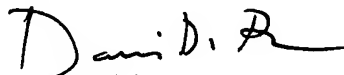
Applicants therefore respectfully request that the rejection of independent claim 22 and its dependent claims 23-32 under §102(e) be withdrawn. Again, these dependent claims recite further elements and limitations that are neither taught nor suggested by Hosomi et al.

Accordingly, all claims 1-32 are patentable over the Hosomi reference.

The Director is authorized to charge any fee deficiency required by this paper or credit any overpayment to Deposit Account No. 23-1123.

Respectfully submitted,

WESTMAN, CHAMPLIN & KELLY, P.A.

By: 
David D. Brush, Reg. No. 34,557
Suite 1600 - International Centre
900 Second Avenue South
Minneapolis, Minnesota 55402-3319
Phone: (612) 334-3222 Fax: (612) 334-3312

DDB:tkj